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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/717,570 | 11/21/2000 | Carol L. Thompson | 10001151 | 2113 |

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| EXAMINER | |
|---|---|
| VU, TUAN A | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2124 | 9 |

DATE MAILED: 04/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/717,570 | THOMPSON, CAROL L. | |
| | Examiner | Art Unit | |
| | Tuan A Vu | 2124 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *25 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

1. This action is responsive to the Applicant's response filed 2/25/2004.

As indicated in Applicant's response, claims 1-10 have been amended and claims 11-15 added. Claims 1-15 are pending in the office action.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-7, 9-10, and 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hooker, USPN: 5,787,286 ( hereinafter Hooker), in view of Austin, USPN: 5,644,709 ( hereinafter Austin).

**As per claim 1**, Hooker discloses an apparatus for performing execution performance evaluation, the apparatus comprising:

logic configured to receive a first set of instructions (e.g. col. 1, lines 63-64);

logic configured to generate an initial instruction schedule and an instrumentation instruction stream from the first set of instructions (e.g. Fig. 1 – Note: locating of bubbles done by compiler implicitly discloses analyzing of program scheduler data),

such that the initial instruction schedule is devoid of code sequences comprising performance check functions (e.g. col. 4, line 58 to col. 5, line 5) and such that code sequences of the instrumentation instruction stream are associated with a corresponding set of one or more

instructions in the initial instruction schedule (e.g. col. 3, lines 21-25, lines 29-34; col. 6, lines 2-16);

logic configured to evaluate the initial instruction schedule to determine whether the initial instruction schedule includes spare instruction slots into which said code sequences associated with the performance check functions can be inserted (e.g. col. 2, lines 33-48; col. 3, lines 29-34), such that a final instruction schedule responsive to the initial schedule would not require a longer run time than the initial instruction schedule (e.g. col. 3, lines 47-50; col. 6, lines 48-57; col. 4, lines 33-35); and

logic configured to generate the final instruction schedule responsive to the initial instruction schedule, the instrumentation instruction stream, and said logic configured to evaluate (e.g. col. 4, lines 12-33; col. 6, lines 2-16).

But Hooker does not explicitly mention that the execution performance evaluation functions and that the performance check functions are correctness-checking functions. Hooker's approach in monitoring arithmetic operations via tabulation type instrumentation strongly suggests calculation of values to delimit range, values relationship with each other, and their evolution (e.g. col. 4, lines 2-24), as well as suggesting obtaining data associated with memory boundaries (e.g. floating point overflow) checking to the effect as to evaluate or improve execution performance. The checking for memories usage correctness was a known concept in the art of performance benchmarking and evaluation checking at the time the invention was made. Austin, in a method to add instrumentation code for performance evaluation analogous to Hooker, does disclose correctness checking on memories bounds in order to improve performance ( e.g. col. 26, line 39 to col. 28, line 7). It would have been obvious for one of

ordinary skill in the art at the time the invention was made to add to the performance check/measurement (*tabulation*) instructions as taught by Hooker the memory-related correctness checking instructions by Austin, in case Hooker does not already include such instructions, because checking memory usage correctness would avert conflict handling resources and thereby improve performance as intended by performance evaluation known in benchmarking and architecture performance improvement techniques both intended by Hooker and Austin.

Nor does Hooker explicitly disclose that the instrumentation instruction stream associated with the corresponding instructions of the initial instruction schedule is a conditional instruction stream. The analysis of the initial program schedule in order to insert instrumentation code based on compiler directives which allocate place holders as taught by Hooker (col. 3, line 40 to col. 4, line 37) indicates some conditions under which tabulation code, i.e. conditionally inserted code stream, can be inserted in order to obviate intrusion into execution performance of the initial instruction stream. Hence, the generating of conditional instruction stream based on the condition that some compiler-allocated bubbles exist implicitly discloses creation of conditional instruction stream associated with the initial instruction schedule.

**As per claim 2**, Hooker ( in combination with Austin) discloses correctness checking to evaluate at least one of a value, a range of values, and a relationship between values (e.g. *tabulator, floatCnt* - col. 4, lines 2-24; col. 5, line 15 to col. 6, line 16).

**As per claim 3**, Hooker discloses generating of initial and conditional instruction stream in response to an input to a compiler (e.g. Fig. 1; col. 3, lines 21-64).

**As per claim 4**, this claim is a apparatus/means version of claim 1 and includes means for

receiving ( first set of instruction);

generating ( initial and conditional instruction stream);

and evaluating ( instruction schedule); all of which having been addressed with the corresponding rejections as set forth in claim 1.

Further, Hooker discloses means for inserting code sequences associated with the correctness checking functions if enough spare instructions slots exist in the initial instructions schedule (e.g. Fig. 1; col. 5, line 15 to col. 6, line 16) for accommodating said code sequences. The conditional instruction stream limitation has been addressed in claim 1 and the correctness checking functions limitation also addressed therein using the rationale combining Hooker and Austin's respective approach in instrumentation for performance evaluation.

**As per claim 5**, this claim corresponds to claim 2, hence is rejected with the same rejection as set forth therein.

**As per claim 6**, this is a method claim of claim 4; and includes all the steps recited therein; hence is rejected using the corresponding rejections as set forth therein.

**As per claim 7**, Hooker ( combined with Austin) discloses fitting code sequence associated with a corresponding portion of the initial instruction schedule (e.g. Fig. 1; col. 5, line 15 to col. 6, line 16) but does not explicitly disclose comparing run time length of one or more spare instruction slots with run time length of such code sequence. The teaching by Hooker as to avoid intrusion whatsoever into the initial execution performance by placing tabulation code sequences in a bubble or spare slots at least discloses a capability to see that the insertion would

not exceed the size of the bubble; otherwise achieving with zero code performance degradation would not be done (col. 6, lines 44-57). In other words, should the comparing of length of the spare slots available and length of the slots taken by the tabulation code sequences not be effected as shown by Hooker's compiler ( col. 3, lines 29-53; Fig. 1), the teaching that zero code execution degradation by Hooker would fail; hence the limitation of comparing as claimed is thereby inherent.

**As per claim 9**, this claim is a computer-readable medium version of claim 4 and includes means for

receiving ( first set of instruction);

generating ( initial and conditional instruction stream); and

evaluating ( instruction schedule); and inserting ( code sequences); all of which having been addressed with the corresponding rejections as set forth in claim 4.

The conditional instruction stream limitation has been addressed in claim 1 and the correctness checking functions limitation also addressed therein using the rationale combining Hooker and Austin's respective approach in instrumentation for performance evaluation.

**As per claim 10**, this claim corresponds to claim 4, hence is rejected with the same rejection as set forth therein.

**As per claim 12,** with reference to claim 1, Hooker discloses that the evaluating the initial instruction schedule identifies code sequences within the conditional instruction stream for insertion (e.g. col. 5, line 10 to col. 6, line 25 – Note: based on the slots allotted from the bubbles identifying what tabulator instructions, e.g. *addi*, to fit in those bubbles reads on identifying code sequences for insertion).

**As per claim 13**, Hooker does not disclose identifying code sequence having the length that exceeds the length of a corresponding spare instruction slot; but this limitation would be implicitly disclosed in that not all tabulation instructions as identified by the compiler are necessarily shorter in length than the length of the spare bubble.

**As per claim 14**, Hooker discloses inserting of code sequences into spare slots (e.g. Fig. 1; col. 4, lines 12-33; col. 6, lines 2-16).

**As per claim 15**, refer to claim 3 for corresponding rejection.

4. Claims 8 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hooker, USPN: 5,787,286, and Austin, USPN: 5,644,709; as applied to claim 6, 1, and further in view of Houldsworth, USPN: 6,526,421 ( hereinafter Houldsworth).

**As per claim 8**, Hooker does not explicitly disclose discarding code sequences whose run time length is greater than that of the spare instruction slots associated with the initial instruction schedule. By in view of the rationale as set forth in claim 7, the possibility of not using a longer run time length tabulation code than the identified spare slots is strongly suggested from the Hooker's teachings. Guarding from using some instrumentation code sequences at insertion points available in the initial code based on execution time constraints so to optimize or maximize non-intrusive code addition was a known concept at the time the invention was made. Houldsworth, in a method to provide zero code intrusion in inserting additional code analogous to Hooker's use of bubbles during execution of a program, discloses use of predicates to determine when and when not to use a certain code sequences for insertion in the initial program (e.g col. 6, line 37 to col. 7, line 9). In case Hooker's method does not provide compiler commands to discard code sequences whose run time length would be longer than that of the

spare slots, it would have been obvious for one of ordinary skill in the art at the time the invention was made to provide compiler directives so as to use the guarding technique by Houldsworth, discard unfit code sequences and utilizing correctly fit code sequences thereby not to exceed the allotted space holder run-time length and thereby support the non-intrusiveness of code adding and not degrade the execution performance of the initial program as targeted by Hooker.

**As per claim 11**, this claim corresponds to claim 8, hence is rejected with the same rejection as set forth therein.

***Response to Arguments***

5. Applicant's arguments with respect to claim 1-10 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan A Vu whose telephone number is (703)305-7207. The examiner can normally be reached on 8AM-4:30PM/Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki can be reached on (703) 305-9662.

**Any response to this action should be mailed to**:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

**or faxed to:**

(703) 872-9306 ( for formal communications intended for entry)

**or:** (703) 746-8734 ( for informal or draft communications, please consult Examiner before using this number)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington. VA. , 22202. 4th Floor( Receptionist).

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

VAT
April 7, 2004

TODD INGBERG
PRIMARY EXAMINER